CASIO.

SCIENTIFIC CALCULATOR
CALCULADORA CIENTIFICA

fx-250D/fx-82D

CASIO

SA08690006A
Printed in Japan

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Dear customer,

Thank you very much for purchasing our electronic calculator.

To fully utilize its features no special training is required, but we suggest you study this operation manual to become familiar with its many abilities. To help ensure its longevity, do not touch the inside of the calculator, avoid hard knocks and unduly strong key pressing. Extreme cold (below 32°F or 0°C), heat (above 104°F or 40°C) and humidity may also affect the functions of the calculator. Never use volatile fluid such as lacquer thinner, benzine, etc. when cleaning the unit. For servicing contact your retailer or nearby dealer.

Before starting calculation, be sure to press the [ON] key and to confirm that "0." is shown on the display.

* *Special care should be taken not to damage the unit by bending or dropping. For example, do not carry it in your hip pocket.*

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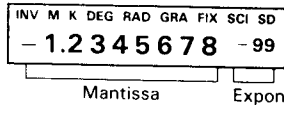
1/GENERAL GUIDE

1-1 Modes

To put the calculator into a desired operating mode, or to select a specific angular unit, press [MODE] first, then [·], [0], [4],... or [9].

- [MODE] [·] – SD is displayed. Calculate standard deviation.
- [MODE] [0] – COMP mode. Carry out ordinary arithmetic and functional calculations.
- [MODE] [4] – DEG is displayed. Use degrees as the unit of angle measurement.
- [MODE] [5] – RAD is displayed. Use radians as the unit of angle measurement.
- [MODE] [6] – GRA is displayed. Use grads as the unit of angle measurement.
- [MODE] [7] – Press any number from 0 to 7 to indicate how many decimal places you want displayed (FIX is displayed).
- [MODE] [8] – Press any number from 1 (1 digit) to 8 (8 digits) to indicate how many significant digits you want displayed (SCI is displayed).
- [MODE] [9] – Releases instructions entered in [MODE] [7] and [MODE] [8]. This operation also changes the range of the exponent display (see page 6).

1-2 The display



The display shows input data, interim results and answers to calculations. The mantissa section displays up to 8 digits. The exponent section displays up to ±99.

-E- or -C-	Error indication (see page 9).
INV	Pressing of [INV] (see page 31).
M	Something is being stored in the Memory (see page 32).
K	A constant is being used in calculations (see page 31).
DEG or RAD or GRA	Angular unit (see page 40).
FIX	Decimal places of a displayed value is being designated (see page 44).
SCI	Significant digits of a displayed value is being designated (see page 44).
SD	Standard deviation calculation (see page 47).
45␣12␣23.	45-12/23 (see page 34).
12°3°45.6	12°3'45.6" (see page 39).

■ Exponential Displays

The display can show calculation results only up to 8 digits long. When an intermediate value or a final result is longer, the calculator automatically switches over to exponential notation. Values greater than 99,999,999 are always displayed exponentially, while the lower limit is selectable. Note the following:

Type	Lower limit	Upper limit
A (Norm 1)	0.01	99,999,999
B (Norm 2)	0.0000001	99,999,999

Values less than the lower limits or greater than the upper limit shown above are displayed using exponential format.

Use the following procedure to switch between the Type A lower limit and the Type B lower limit:

① Check the display to see if the FIX or SCI symbols are shown, indicating that the number of significant digits or the number of decimal places have been specified. If either of the symbols is shown, press [MODE] [9] to cancel the specification.

② Perform the following calculation:

1 ⊟ 200 ⊟

③ Look at the display to see what the current lower limit is.

If the display reads:
5. ^{03}, the current setting is Type A

5. $^{-03}$

If the display reads:
0.005, the current setting is Type B

0.005

④ Press [MODE] [9] to switch between the Type A and Type B lower limits.

*Note that the lower limit is not changed if you press [MODE] [9] while the number of significant digits (SCI displayed) and / or the number of decimal places (FIX displayed) are specified. The first time you press [MODE] [9], you clear the FIX and SCI specifications, and so you must press [MODE] [9] again to change the lower limit.

2/ORDER OF OPERATIONS AND LEVELS

Operations are performed in the following order of precedence:

1. Functions
2. x^y, $x^{1/y}$, R→P, P→R
3. ×, ÷
4. +, −

Operations with the same precedence are performed from left to right, with operations enclosed in parentheses performed first. If parentheses are nested, the operations enclosed in the innermost set of parentheses are performed first.

*Registers L_1 through L_6 are provided to store operations of lower precedence (including parenthetical operations). Since six registers are provided, calculations up to six levels can be retained.

*Since each level can contain up to three open parentheses, parantheses can be nested up to 18 times.

Example (4 levels, 5 nested parentheses)

Operation

[2] [×] [(] [(] [(] [3] [+] [4] [×] [(] [(] [5] [+] [4] [)] [÷] [3] [)] [)]

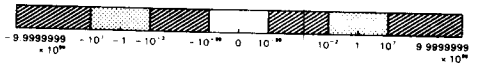
1 level 1 level 1 level 1 level A

[÷] [5] [)] [+] [9] [)] [=]

Register contents at point A.

x	4
L_1	((5 +
L_2	4 ×
L_3	((((3 +
L_4	2 ×
L_5	
L_6	

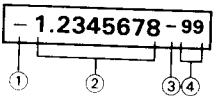
3/CALCULATION RANGE AND SCIENTIFIC NOTATION



Normal display

Scientific notation

When the answer exceeds the normal display capacity, it is automatically shown by scientific notation, 8-digit mantissa and exponents of 10 up to ±99.



① The minus (−) sign for mantissa
② The mantissa
③ The minus (−) sign for exponent
④ The exponent of ten

The whole display is read:

$-1.2345678 \times 10^{-99}$

*Entry can be made in scientific notation by using the [EXP] key after entering the mantissa.

EXAMPLE	OPERATION	READ-OUT
$-1.2345678 \times 10^{-3}$ ($= -0.0012345678$)		
	1 [.] 2345678 [+/-]	−1.2345678
	[EXP]	−1.2345678 00
	3 [+/-]	−1.2345678 −03

4/OVERFLOW OR ERROR CHECK

Overflow or error is indicated by the "-E-" or "-E -" sign and stops further calculation.

Overflow or error occurs:

a) When an answer, whether intermediate or final, or accumulated total in the memory is more than $\pm 9.9999999 \times 10^{99}$ ("-E-" sign appears).

b) When function calculations are performed with a number exceeding the input range ("-E-" sign appears).

c) When unreasonable operations are performed in statistical calculations ("-E-" sign appears).

d) When the total number of levels of explicity and/or implicity (with addition-subtraction versus multiplication-division including x^y and $x^{1/y}$) nested parentheses exceeds 6, or more than 18 pairs of parentheses are used ("-E -" sign appears).

Ex.) You have pressed the [(] key 18 times continuously before designating the sequence of [2] [+] [3] [×].

To release these overflow checks:

a), b), c) ..... Press the [AC] key.

d) ..... Press the [AC] key. Or press the [C] key, and the intermediate result just before the overflow occurs is displayed and the subsequent calculation is possible.

Memory protection:

The content of the memory is protected against overflow or error and the accumulated total is recalled by pressing the [MR] key after the overflow check is released by the [AC] key.

5/POWER SOURCE

•fx-250D

Two alkaline-manganese batteries (LR44) give approximately 750 hours continuous operation (1,820 hours on type SR44 (G-13) silver oxide batteries). When battery power decreases, the whole display darkens. Batteries should then be renewed. Be sure to switch OFF the power before changing.

Battery replacement

1. Open the battery compartment lid on the back of the unit by loosening the screw. Never touch the inside of the unit except the battery compartment.
2. Remove dead batteries and insert new batteries with porality as indicated.
3. Replace the lid. Screw carefully.

PRECAUTIONS:

Incorrectly using batteries can cause them to burst or leak, possibly damaging the interior of the unit. Note the following precautions:

- Be sure that the positive (+) and negative (−) poles of each battery are facing in the proper direction.
- Never mix batteries of different types.
- Never mix old batteries and new ones.
- Never leave dead batteries in the battery compartment.
- Remove the batteries if you do not plan to use the unit for long periods.
- Replace the batteries at least once every 2 years, no matter how much the unit is used during that period.
- Never try to recharge the batteries supplied with the unit.
- Do not expose batteries to direct heat, let them become shorted, or try to take them apart.

Keep batteries out of the reach of small children. If swallowed, consult with a physician immediately.

•fx-82D

Two AA size manganese dry batteries (UM-3) give approximately 9,000 hours continuous operation (approx. 11,000 hours on type R6P (SUM-3)). When battery power decreases, the whole display darkens. Batteries should then be renewed. Be sure to switch OFF the power before changing.

Battery replacement

1. Open the back panel of the unit by loosening the screws and remove dead batteries.
2. Insert new batteries with polarity as indicated.
3. Replace the back panel.

PRECAUTIONS:

Incorrectly using batteries can cause them to burst or leak, possibly damaging the interior of the unit. Note the following precautions:

- Be sure that the positive (+) and negative (−) poles of each battery are facing in the proper direction.
- Never mix batteries of different types.
- Never mix old batteries and new ones.
- Never leave dead batteries in the battery compartment.
- Remove the batteries if you do not plan to use the unit for long periods.
- Replace the batteries at least once every 2 years, no matter how much the unit is used during that period.
- Never try to recharge the batteries supplied with the unit.
- Do not expose batteries to direct heat, let them become shorted, or try to take them apart.

Should a battery leak, clean out the battery compartment of the unit immediately, taking care to avoid letting the battery fluid come into direct contact with your skin.

Auto power-off function

This unit automatically switches OFF if not operated for approximately 6 minutes. Power can be restored by pressing the [ON] key. Memory contents and mode setting are retained even when power is switched off.

6/SPECIFICATIONS

BASIC OPERATIONS

4 basic calculations, constants for $+/-/\times/\div/x^y/\sqrt[y]{x}$, parenthesis calculations and memory calculations.

BUILT-IN FUNCTIONS

Trigonometric/inverse trigonometric functions (with angle in degrees, radians or grads), hyperbolic/inverse hyperbolic functions, common/natural logarithms, exponential functions (common antilogarithms, natural antilogarithms), powers, roots, square roots, cube roots, squares, reciprocals, factorials, conversion of coordinate system (R→P, P→R), random number, π, fractions and percentages.

STATISTICAL FUNCTIONS

Population standard deviation, sample standard deviation, arithmetic mean, sum of square value, sum of value and number of data.

CAPACITY

Entry/basic calculations

8-digit mantissa, or 8-digit mantissa plus 2-digit exponent up to $10^{\pm 99}$.

Fraction calculations

Max. 3-digit mantissa for each integer, numerator or denominator and at the same time max. 6-digit mantissa for the sum of each part.

Scientific functions	Input range
$\sin x/\cos x/\tan x$	$\lvert x \rvert <$ 1440 degrees ($<8\pi$ rad / $<$1600 grad)
$\sin^{-1}x/\cos^{-1}x$	$\lvert x \rvert \leqq 1$
$\tan^{-1}x$	$\lvert x \rvert < 10^{100}$
$\sinh x/\cosh x$	$\lvert x \rvert \leqq 230.2585$
$\tanh x$	$\lvert x \rvert < 10^{100}$
$\sinh^{-1}x$	$\lvert x \rvert < 5 \times 10^{99}$
$\cosh^{-1}x$	$1 \leqq x < 5 \times 10^{99}$
$\tanh^{-1}x$	$\lvert x \rvert < 1$
$\log x/\ln x$	$10^{-99} \leqq x < 10^{100}$
e^x	$-10^{100} < x \leqq 230.2585$
10^x	$-10^{100} < x < 100$

x^y	$x>0 \rightarrow -10^{100}<y\cdot\log x<100$ $x=0 \rightarrow y>0$ $x<0 \rightarrow y$: integer or $\pm 1/2n+1$ (n : integer)
$x^{1/y}$	$x>0 \rightarrow y\neq 0\ -10^{100}<1/y\cdot\log x<100$ $x=0 \rightarrow y>0$ $x<0 \rightarrow y$: odd number or $\pm 1/n$ (n : natural number)
$\sqrt{x}$	$0\leqq x<10^{100}$
x^2	$\lvert x\rvert<10^{50}$
$\sqrt[3]{x}$	$\lvert x\rvert<10^{100}$
$1/x$	$\lvert x\rvert<10^{100}\ (x\neq 0)$
$x!$	$0\leqq x\leqq 69$ (x : integer)
REC →POL	$\sqrt{x^2+y^2}<10^{100}$
POL→REC	$\lvert\theta\rvert<1440$ degrees $\left(\begin{matrix}<8\pi \text{ rad}\\<1600 \text{ grad}\end{matrix}\right)$, $\lvert r\rvert<10^{100}$
° ′ ″	up to second
π	8 digits

*Errors are cumulative with such internal continuous calculations as x^y, $x^{1/y}$, $x!$, $\sqrt[3]{}$ so accuracy may be adversely affected.

***Output accuracy**

± 1 in the 8th digit.

DECIMAL POINT

Full floating with underflow.

EXPONENTIAL DISPLAY

Norm 1 $10^{-2}>\lvert x\rvert$, $\lvert x\rvert\geqq 10^{8}$

Norm 2 $10^{-9}>\lvert x\rvert$, $\lvert x\rvert\geqq 10^{8}$

READ-OUT

Liquid crystal display, suppressing unnecessary 0's (zeros).

POWER SOURCE

•fx-250D

Power source: Two alkaline-manganese batteries (LR44 or SR44 (G-13))

Battery life: The unit gives approximately 750 hours continuous operation on type LR44 (1,820 hours on type SR44 (G-13)).

Power consumption: 0.0004W

•fx-82D

Power source: Two AA size manganese dry batteries (UM-3 or R6P (SUM-3))

Battery life: The unit gives approximately 9,000 hours continuous operation on type UM-3 (11,000 hours on type R6P (SUM-3)).

Power consumption: 0.0004W

AMBIENT TEMPERATURE RANGE

0°C – 40°C (32°F – 104°F)

DIMENSIONS

•fx-250D

10mmH × 73mmW × 140mmD
($^3/_8$"H × $2^7/_8$"W × $5^1/_2$"D)

•fx-82D

21.5mmH × 76mmW × 153mmD
($^7/_8$"H × 3"W × 6"D)

WEIGHT

•fx-250D 63 g (2.2 oz) including batteries

•fx-82D 121 g (4.3 oz) including batteries